

JAPANESE

[JP,08-331509,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

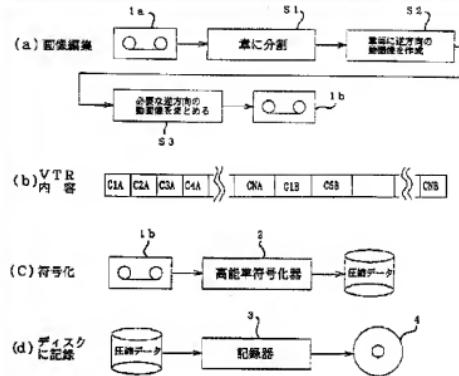
[Industrial Application] This invention relates to an image recording medium which records the moving image information by which high efficiency coding was carried out, a manufacturing method for the same, and its regeneration method.

[0002]

[Description of the Prior Art] In high efficiency coding which compressed the code amount of picture information, an independent frame is set up with a prescribed interval from two or more continuous frames, and it becomes an un-independent frame except this independent frame. Said independent frame is a frame which prediction in a frame is performed independently and coded from other frames, and an un-independent frame is a frame coded using the inter frame prediction between other frames.

[0003] As this example, it is MPEG (Motion Picture Experts Group). Coding of a method is explained based on drawing.
 5. Drawing 5 is a figure showing the example of

Drawing selection Representative draw



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arrangement of the various frames in an MPEG system. In drawing 5, (a) shows the order of a frame of the picture before being coded, and (b) shows the order of a frame of the picture after being coded.

[0004]With a group OBU picture (below Group of Picture describes it also as GOP). In order to carry out provoking [of the signal processing of picture information], two or more frames were summarized to one, in the example of drawing 5, one GOP comprises 15 frames and at least one I frame is set up for every GOP. In the figure, what is being described as I like the frame number 7 or 22 is a frame which points out the I frame and is coded only using the information in a present frame, and it is called an independent frame or intra-frame.

[0005]Describing it as P like the frame number 1 or 4 predicts a present frame from the past I frame, and it acquires an inter-frame prediction signal, and it is a frame by which the difference of a present frame and said inter-frame prediction signal is coded, and is called a uni-directional prediction frame or p frames.

[0006]That the figure is describing B like the frame number 5 or 6, A present frame is predicted from the I frame or p frames of the past and/or the future, an inter-frame prediction signal is acquired, and it is called a bidirectional prediction frame or the B frame with the frame by which the difference of a present frame and said inter-frame prediction signal is coded. When coded, there are few code amounts of the p frames by which only the difference of a signal is coded, or the B frame far as compared with the code amount of the I frame.

[0007]The order of the frame before being coded is shown in (a) of drawing 5. In coding, one GOP comprises the frame numbers 5-19, for example. The order by which the coded information is recorded on a recording medium is shown in (b) of the figure, and one GOP is constituted from the frame 7 by the frame 18, and let the head be the I frame. Although the order recorded on a recording medium is the same as the order of a frame displayed on a display after decoding, Unlike the order of coding for a while, since the information on the I frame and p frames is required for decoding of the B frame, at the time of coding, the p frames which were back are recorded ahead of the B frame, and are previously read from the B frame at the time of reproduction.

[0008]Since decoding of said P and the B frame is impossible independently when picture information is reproduced with playback equipment from the recording medium for which the numerals of said I, P, and the B frame were recorded, For example, by the image of 30 frames per second, it is decoded by abbreviated 0.5 second bits

equivalent to 1GOP, and this serves as the minimum unit which can restore a perfect image.

[0009]By the way, when reproducing said recorded compression moving image information, there is a regeneration method called special reproduction. There are three methods, fast reproduction (order opposite direction), slow reproduction (order opposite direction), and reverse reproduction, in special reproduction, and various kinds of methods are proposed about the fast reproduction of the compression animation (for example, indicated to Japanese Patent Application No. No. 82782 [five to] and Japanese Patent Application No. No. 16008 [six to] for which these people applied).

[0010]Slow reproduction is a forward direction throw and an opposite direction throw, and methods differ greatly. A forward direction throw can respond by application of forward direction usual speed reproduction (normal reproduction). When the example of arrangement of the various frames which show this to drawing 5 is first explained with reference to the explanatory view at the time of the normal reproduction shown in drawing 6, normal reproduction, As shown in drawing 6, when the frame numbers 7, 5, 6, and 10 are read, the frame numbers 5, 6, and 7 are decoded, and further, when the frame numbers 8, 9, and 13 are read, the frame numbers 8, 9, and 10 are decoded.

[0011]On the other hand, the forward direction slow reproduction should just make display time of decoding longer than the time of normal reproduction. The slow reproduction of 1/the degree of 2nd speed is made by making the display of the frame number 5 which drawing 7 showed the display example at the time of 1 / 2nd speed degree slow reproduction to the time of the normal reproduction shown in drawing 6, for example, was decoded in the period equivalent to two frames. Such slow reproduction can be realized comparatively easily, if there is a buffer of an initial complement so that the data of a decoder may not carry out excess and deficiency (several [of GOP capacity / 1/]). In drawing 7, the dormant period of data read and the blank of decoding of the blank of read-out are the dormant periods of decoding.

[0012]On the other hand, although opposite direction slow reproduction naturally corresponds by application of opposite direction usual speed reproduction (reverse reproduction), the quantity of a data buffer needed becomes very large, and the reverse reproduction of an animation by which highly efficient compression encoding was carried out is difficult to realize. Reverse reproduction is explained about the example of arrangement of the various frames

shown in drawing 5. A compression animation makes GOP a unit and is coded, and in GOP of the frame numbers 5-19, if the order of a repeat display is set to the frame numbers 19, 18, and 17, ..., 7, 6 and 5, it will become reverse reproduction. Here, this GOP is creating P and the B frame on the basis of the I frame (intra-frame) of the frame number 7.

[0013]Namely, in order to reproduce the p frames of the frame number 19, since these p frames boil the image data of the past frame, are based and perform inter frame prediction, The I frame and all the p frames in applicable GOP are required, and the I frame of the frame number 7 which is not the I frame of the frame number 22 but the past I frame is required as an I frame, and the past p frames are needed. Therefore, in order to decode the p frames of the frame number 19, as shown in drawing 8, it is necessary to read the frame numbers 7, 10, 13, 16, and 19. In order to decode the B frame of the frame number 18, the I frame and all the p frames in GOP are required similarly, and it is necessary to read the frame numbers 7, 10, 13, 16, 19, and 18. However, in this way, in order to reproduce one frame, it is disadvantageous to read many same frames in time, and it is necessary to read a part for 1GOP at once, and to memorize it.

[0014]

[Problem(s) to be Solved by the Invention]For above-mentioned reverse reproduction, after all memorizing the data of GOP to a buffer memory equal to the capacity of ** GOP, decoding processing is performed.

** In order to carry out reverse reproduction continuously, the next of the frame number 18, Although drawing 5 does not show, the I frame of the frame number (-8) which is the I frame 15 frames before the I frame of the frame number 7 is searched, GOP in front of [of this GOP (frame numbers 5-19)] one is read and recorded on a different buffer memory (equal to GOP capacity) from what memorized **.

** Since there is time required for a search, the speed of read-out must be quicker than an ordinary reproduction reading speed.

The conditions to say are needed.

[0015]That is, at the time of reverse reproduction, the buffer memory for decoding is [more than 2GOP capacity] required, and it is necessary to raise the reading speed of a recording medium further by the time which starts a search at the minimum. For playback equipment, this will force it big burdens, such as complication of a control means, improvement in the speed of a reversion system, and increase of a required memory size, and is not practical. Still more complicated processing will be performed and practicality falls [inversion slow reproduction] the above-

mentioned reverse reproduction further. For this reason, in the moving image information by which high efficiency coding was carried out, reverse reproduction and inversion slow reproduction were impossible as a matter of fact.

Although this did not become so big a problem of a movie etc. by a tropism animation on the other hand, it was a big problem by the animation in which reverse-direction-reproduction systems, such as a sports program and an educational program, have an important element.

[0016]This invention is invented in view of said problem, and the purpose is an image recording medium which records the moving image information by which high efficiency coding was carried out, and there is in providing an image recording medium which can perform easily special reproduction, such as reverse reproduction and inversion slow reproduction, and a regeneration method for the same.

[0017]

[Means for Solving the Problem]To achieve the above objects, an image recording medium concerning this invention, It is an image recording medium which records moving image information by which high efficiency coding was carried out, moving image information to record was divided into two or more chapters, and coding record of moving image information of a forward direction of a divided chapter and the moving image information of an opposite direction corresponding to moving image information of the forward direction edited beforehand was carried out.

[0018]An image recording medium concerning this invention carried out coding record of the pair of moving image information of a forward direction and an opposite direction of each chapter which is said image recording medium and was divided one by one continuously.

[0019]An image recording medium concerning this invention is said image recording medium, and carry out coding record of the moving image information of a forward direction from the starting point of record on a recording medium in which random access is possible, and. Coding record of the moving image information of an opposite direction corresponding to moving image information of a forward direction edited beforehand was carried out from an end point of moving image information of a forward direction.

[0020]An image recording medium concerning this invention is said image recording medium, and is characterized by moving image information of an opposite direction being 50% or less of amount of information to the total amount of information recorded on one recording medium.

[0021]A manufacturing method of an image recording medium concerning this invention has a step which codes and records a step which divides into two or more chapters moving image information which should be recorded, said divided moving image information of a forward direction of a chapter, and moving image information of an opposite direction corresponding to moving image information of the forward direction edited beforehand.

[0022]A regeneration method of an image recording medium concerning this invention is a regeneration method of said image recording medium, chooses each chapter of said recording medium, and reproduces arbitrarily moving image information of a forward direction and an opposite direction.

[0023]

[Function]In an image recording medium concerning this invention, and a manufacturing method for the same.

Although reverse reproduction of a picture is performed by having divided the moving image information to record into two or more chapters, and having carried out coding record of the moving image information of the forward direction of the divided chapter, and the moving image information of the opposite direction corresponding to the moving image information of the forward direction edited beforehand, Do not need the memory for decoding, and complicated processing, can reproduce the moving image information of both a forward direction and an opposite direction by normal rotation reproduction, the chapter which recorded the moving image information of the opposite direction is chosen, and it is made to perform normal rotation reproduction or normal rotation slow reproduction, Special reproduction, such as reverse reproduction and inversion slow reproduction, can be performed easily.

[0024]By having carried out coding record of the pair of the moving image information of the forward direction and opposite direction of each chapter which the image recording medium concerning this invention is said image recording medium, and was divided one by one continuously, Make the chapter which recorded the animation of the forward direction or the opposite direction skip, and if normal rotation reproduction is made and carried out, the one-way nature moving image information which the forward direction or the opposite direction followed is renewable, and. Making the chapter which recorded the animation of the opposite direction by normal rotation reproduction skip, and reproducing only the moving image information of a forward direction, as the chapter on which the moving image information of the opposite direction was recorded in the required part is chosen, the animation of the opposite direction of a required part can be obtained easily.

[0025]The image recording medium concerning this invention is said image recording medium, and carry out coding record of the moving image information of a forward direction from the starting point of record on the recording medium in which random access is possible, and. By carrying out coding record of the moving image information of the opposite direction corresponding to the moving image information of a forward direction edited beforehand from the end point of the moving image information of a forward direction, The record section of the moving image information of a forward direction and an opposite direction can be classified and recorded, If the chapter of only the moving image information of a forward direction or an opposite direction on which the moving image information of the opposite direction was recorded in the required part could reproduce the tropism animation continuously on the other hand, without needing operation in any way, and reproducing the moving image information of a forward direction is accessed by normal rotation reproduction, the moving image information of an opposite direction is renewable.

[0026]When the moving image information of an opposite direction considers it as 50% or less of amount of information to the total amount of information which the image recording medium concerning this invention is said image recording medium, and was recorded on one recording medium in which random access is possible, As only the animation of the opposite direction to need is recorded, the amount of recorded information of the animation of a forward direction can be increased.

[0027]The regeneration method of the image recording medium concerning this invention, By being a regeneration method of said image recording medium, choosing each chapter of said image recording medium, and reproducing arbitrarily the moving image information of a forward direction and an opposite direction, If the chapter which made unnecessary the special memory which memorizes the information for reverse reproduction, reproduced the picture by normal rotation reproduction using usual playback equipment, and recorded the moving image information of the opposite direction in the required part is chosen, can obtain the animation of reverse reproduction, and. If a picture is reproduced by normal rotation slow reproduction, the animation of inversion slow reproduction can be obtained, and if reproduction orders are programmed for every chapter, the combination image restoration of normal rotation reproduction and reverse reproduction is also automatically renewable.

[0028]

[Example]The image recording medium concerning this

invention is an image recording medium which records the moving image information by which high efficiency coding was carried out. Although reverse reproduction of a picture is performed by dividing the moving image information to record into two or more chapters, and carrying out coding record of the moving image information of the forward direction of the divided chapter, and the moving image information of the opposite direction corresponding to the moving image information of the forward direction edited beforehand. Do not need the memory for decoding, and complicated processing, can reproduce the moving image information of both a forward direction and an opposite direction by normal rotation reproduction, the chapter which recorded the moving image information of the opposite direction is chosen, and it is made to perform normal rotation reproduction or normal rotation slow reproduction. Special reproduction, such as reverse reproduction and inversion slow reproduction, can be performed easily.

[0029] Drawing 1 explains the image recording medium concerning this invention, and first, as shown in the figure (a), it divides and records the original information of the moving image information to record according to information content of the picture, without the chapter (paragraph) C1, C2, C3, and ... The chapter, respectively And the moving image information C1A of a forward direction, C2A, C3A, It is as ..., the moving image information C1B of the opposite direction which edited the moving image information of the forward direction into the opposite direction, C2B, C3B and ..., and ******, and as shown in the figure (b), coding record of the divided pair of the moving image information of the forward direction and opposite direction of each chapter is carried out one by one continuously.

[0030] Therefore, if only the moving image information of a forward direction is reproduced as the chapter which recorded the animation of the opposite direction is made to skip at the time of reproduction, and it goes, it will become the usual normal rotation reproduction (forward direction reproduction). That is, an order of the animation reproduced can reproduce the one-way nature moving image information of C1A, C2A, C3A, C4A, ..., a next door, and the continuous forward direction. Similarly, if only the moving image information of an opposite direction is reproduced by normal rotation reproduction and it goes, it will become a picture of the usual reverse reproduction (reverse direction reproduction). That is, an order of the animation reproduced becomes C1B, C2B, C3B, C4B, and ..., and can reproduce the one-way nature moving image information of the continuous opposite direction.

[0031] case normal rotation reproduction and reverse

reproduction (reverse direction reproduction) are required -- C1A, C1B, C2A, C2B, and --- then, it is good and the reverse reproduction of the scene is obtained by the next of normal rotation reproduction. Making the chapter which recorded the animation of the opposite direction by normal rotation reproduction skip, and reproducing only the moving image information of a forward direction, as the chapter on which the moving image information of the opposite direction was recorded in the required part is chosen, the animation of the opposite direction of a required part can be obtained easily. Also in inversion slow reproduction, it applies to the reverse reproduction mentioned above.

[0032]Arrangement as shown in drawing 2 with the recording medium in which random access is possible is also possible. Namely, carry out coding record of the moving image information C1A of a forward direction, C2A, C3A, C4A, ..., the CNA one by one from the starting point of record, and. By carrying out coding record of the moving image information C1B of the opposite direction corresponding to the moving image information of a forward direction edited beforehand, C2B, C3B, C4B, ..., the CNB one by one from the end point of the moving image information of a forward direction, The record section of the moving image information of a forward direction and an opposite direction can be classified and recorded, Being able to reproduce the one-way nature animation of only the moving image information of a forward direction or an opposite direction continuously by normal rotation reproduction, without needing operation in any way, and reproducing the moving image information of a forward direction. When the animation of an opposite direction needs to be reproduced, if the chapter on which the moving image information of the opposite direction was recorded in the required part is accessed, the moving image information of an opposite direction can be reproduced.

[0033]If the moving image information of an opposite direction does not necessarily need to be reproduced, in the example of record shown in drawing 1. In the example of record which is considered as arrangement as shown in drawing 3(a), and is shown in drawing 2, by considering it as the arrangement shown in drawing 3(b), the information editor of a picture can decrease the quantity of the moving image information of an opposite direction if needed, and can increase the amount of recorded information of the animation of a forward direction in this case. That is, it is A0 (sum of the forward direction amount of information) \geq B0 (sum of the opposite direction amount of information) \geq 0 as the amount of information. In this case, the moving image information of an opposite direction serves as 50% or less of amount of information to the total amount of information

recorded on one recording medium.

[0034]Although this invention records the moving image information by which high efficiency coding was carried out on an image recording medium as it mentioned above, and reverse reproduction and inversion slow reproduction are realized easily, information edit mentioned later is performed to the information storage to an image recording medium. An image recording medium shall explain in the example which is an optical disc, the moving image information of a forward direction shall be recorded the first half of an image recording medium - the middle stage in this example, and only the part which the moving image information of an opposite direction needs for the latter half shall be recorded.

[0035]Drawing 4 is a flow chart explaining the record method to the image recording medium concerning this invention. First, as shown in the figure (a), in the case of an image editing. The moving image information in VTR tape 1a in which the moving image information of the forward direction is recorded is divided for every chapter according to the information content (Step S1), The animation of the opposite direction which creates and (Step S2) needs the animation of an opposite direction for every chapter is packed (Step S3), the moving image information of the opposite direction is recorded on VTR tape 1b with the moving image information of the forward direction recorded on VTR tape 1a, and 1-sized edit is performed.

[0036]In this case, as the contents recorded on VTR tape 1b are shown in the figure (b), after recording the moving image information C1A of a forward direction, C2A, C3A, ..., CNA, the moving image information C5B of the opposite direction to need, ..., CNB are recorded.

[0037]Next, as shown in the figure (c), high efficiency coding of the moving image information recorded on said VTR tape 1b is carried out with the highly efficient coding equipment 2, compressed data is obtained, and the compressed data is recorded on the optical disc 4 with the recorder 3, as shown in the figure (d).

[0038]Therefore, when reproducing the image recording medium ****(ed) by using above-mentioned business, By choosing each chapter of an image recording medium and reproducing arbitrarily the moving image information of a forward direction and an opposite direction, If the chapter which made unnecessary the special memory which memorizes the information for reverse reproduction, reproduced the picture by normal rotation reproduction using usual playback equipment, and recorded the moving image information of the opposite direction in the required part is chosen, the animation of reverse reproduction can be obtained.

[0039]That is, since it is already reversed when the moving image information recorded on VTR1b included in the highly efficient coding equipment 2 is an image of an opposite direction, when decoding using usual playback equipment, an image serves as reverse reproduction only by carrying out normal rotation reproduction. A picture is reproduced by normal rotation reproduction, if the chapter on which the moving image information of the opposite direction was recorded in the required part is searched as an address and normal rotation reproduction is carried out, a picture will serve as reverse reproduction, and if normal rotation slow reproduction of the chapter is carried out, a picture will serve as inversion slow reproduction. If reproduction orders are programmed for every chapter, the image restoration which normal rotation reproduction and reverse reproduction combined is also automatically renewable.

[0040]In the animation by which high efficiency coding was carried out, there are many fields as which reverse reproduction is required. Especially in a sport, education, etc., it is required in many cases. Although reverse reproduction and inversion slow reproduction were impossible practically and only high-speed reverse reproduction was carried out by the conventional method, this invention is coding inversion editing data, solves this problem and expands further the application range of a highly efficient coded dynamic image. That is, in this invention, reverse reproduction is made possible with the recording medium of the moving image information by which high efficiency coding is carried out.

Therefore, moving image information is divided into some chapters (paragraph), and edit creation of the picture of a reverse rotation direction is beforehand carried out for every chapter, and after that, it codes, records on a recording medium, the chapter needed at the time of reproduction is chosen, and the animation of normal rotation and an inversion is obtained by carrying out normal rotation reproduction.

[0041]

[Effect of the Invention]As mentioned above, according to an image recording medium of this invention, and a manufacturing method for the same, the moving image information to record is divided into two or more chapters, Although reverse reproduction of a picture is performed by having carried out coding record of the moving image information of the forward direction of the divided chapter, and the moving image information of the opposite direction corresponding to the moving image information of the forward direction edited beforehand, Do not need the

memory for decoding, and complicated processing, can reproduce the moving image information of both a forward direction and an opposite direction by normal rotation reproduction, the chapter which recorded the moving image information of the opposite direction is chosen, and it is made to perform normal rotation reproduction or normal rotation slow reproduction, It is effective in the ability to perform easily special reproduction, such as reverse reproduction and inversion slow reproduction.

[0042]By having carried out coding record of the pair of the moving image information of the forward direction and opposite direction of each chapter which the image recording medium concerning this invention is said image recording medium, and was divided one by one continuously, Make the chapter which recorded the animation of the forward direction or the opposite direction skip, and if normal rotation reproduction is made and carried out, the one-way nature moving image information which the forward direction or the opposite direction followed is renewable, and. Making the chapter which recorded the animation of the opposite direction by normal rotation reproduction skip, and reproducing only the moving image information of a forward direction, as the chapter on which the moving image information of the opposite direction was recorded in the required part is chosen, it is effective in the ability to obtain the animation of the opposite direction of a required part easily.

[0043]The image recording medium concerning this invention is said image recording medium, and carry out coding record of the moving image information of a forward direction from the starting point of record on the recording medium in which random access is possible, and. By carrying out coding record of the moving image information of the opposite direction corresponding to the moving image information of a forward direction edited beforehand from the end point of the moving image information of a forward direction, The record section of the moving image information of a forward direction and an opposite direction can be classified and recorded, The one-way nature animation of only the moving image information of a forward direction or an opposite direction can be continuously reproduced by normal rotation reproduction, without needing operation in any way, If the chapter on which the moving image information of the opposite direction was recorded in the required part is accessed reproducing the moving image information of a forward direction, it is effective in the moving image information of an opposite direction being renewable.

[0044]When the moving image information of an opposite direction considers it as 50% or less of amount of

information to the total amount of information which the image recording medium concerning this invention is said image recording medium, and was recorded on one recording medium in which random access is possible, As only the animation of the opposite direction to need is recorded, it is effective in the ability to increase the amount of recorded information of the animation of a forward direction.

[0045]The regeneration method of the image recording medium concerning this invention, By being a regeneration method of said image recording medium, choosing each chapter of said image recording medium, and reproducing arbitrarily the moving image information of a forward direction and an opposite direction, If the chapter which made unnecessary the special memory which memorizes the information for reverse reproduction, reproduced the picture by normal rotation reproduction using usual playback equipment, and recorded the moving image information of the opposite direction in the required part is chosen, can obtain the animation of reverse reproduction, and. If a picture is reproduced by normal rotation slow reproduction, the animation of inversion slow reproduction can be obtained, and if reproduction orders are programmed for every chapter, the combination image restoration of normal rotation reproduction and reverse reproduction is also effective in being automatically renewable.

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CLAIMS

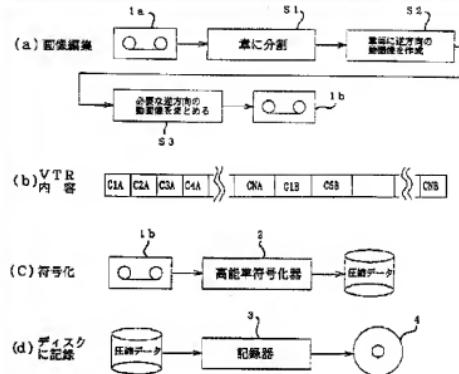
[Claim(s)]

[Claim 1] An image recording medium having divided into two or more chapters moving image information which should be recorded, and carrying out coding record of moving image information of a forward direction of a divided chapter, and the moving image information of an opposite direction corresponding to moving image information of the forward direction edited beforehand in an image recording medium with which moving image information by which high efficiency coding was carried out was recorded.

[Claim 2] The image recording medium according to claim 1 carrying out coding record of the pair of moving image information of said forward direction of each divided chapter, and an opposite direction one by one continuously.

[Claim 3] The image recording medium according to claim 1 characterized by carrying out coding record of the moving image information of an opposite direction corresponding to moving image information of a forward direction edited beforehand from an end point of moving image information of a forward direction while coding record of the moving

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image information of a forward direction is carried out from the starting point of record on a recording medium in which random access is possible.

[Claim 4]The image recording medium according to claim 2 or 3 characterized by moving image information of an opposite direction being 50% or less of amount of information to the total amount of information recorded on one recording medium.

[Claim 5]A manufacturing method of an image recording medium with which dynamic image information which has a step which codes and records a step which divides into two or more chapters moving image information which should be recorded, said divided moving image information of a forward direction of a chapter, and moving image information of an opposite direction corresponding to moving image information of the forward direction edited beforehand was recorded.

[Claim 6]Moving image information of a forward direction of a chapter which is the image recording medium with which dynamic image information by which high efficiency coding was carried out was recorded, divided into two or more chapters moving image information which should be recorded, and was divided, A regeneration method of an image recording medium being a regeneration method which reproduces an image recording medium which carried out coding record of the moving image information of an opposite direction corresponding to moving image information of the forward direction edited beforehand, choosing each chapter of said recording medium, and reproducing arbitrarily moving image information of a forward direction and an opposite direction.

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